ATTACHMENT 1

SAMPLING AND ANALYSIS PLAN

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GROUNDWATER QUALITY MONITORING PROGRAM FOR THE GREGORY CANYON LANDFILL

PREPARED FOR:

Gregory Canyon Ltd.
3 Embarcadero Center, Suite 2360
San Francisco, California 94111

PREPARED BY:

GeoLogic Associates and
Bryan A. Stirrat & Associates
16885 West Bernardo Drive, Suite 305
San Diego, California 92127

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FOR GREGORY CANYON LANDFILL
SAN DIEGO COUNTY, CALIFORNIA

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) provides guidelines to be followed for Detection Monitoring at the proposed Gregory Canyon Sanitary Landfill, pursuant to Title 27, Chapter 3, Subchapter 3 of the California Code of Regulations.

The primary objective of the SAP is to provide a series of procedures for obtaining field measurements and chemical data in a consistent manner, in accordance with USEPA criteria for precision, accuracy, representativeness, completeness, and comparability. Project-specific SAP objectives have been developed following the objectives outlined in the U.S. EPA documents entitled Test Methods for Evaluating Solid Waste (US EPA, 1986), and Methods for Chemical Analysis of Water and Wastes (US EPA, 1983).

The SAP has been designed to control data quality within current US EPA established limits, and the related protocols in the SAP were tailored to both the project objectives and the data quality objectives. Quality Assurance/Quality Control (QA/QC) associated with the sampling and screening methodologies will consist of the following activities:

- Sample collection, preservation, transportation and storage
- Sample custody documentation
- Calibration and preventive maintenance of analytical instrumentation and apparatus
- Data reduction, validation, and reporting
- Assessment of data quality
- Analytical quality control
- Reporting

During the assessment of field and laboratory analytical data, qualitative limitations associated with the individual measurements will be identified and defined. Several types of QA/QC samples will be used in the programs (e.g., field and trip blanks, and duplicate samples), to provide the primary basis for quantitatively estimating data quality. The QA/QC activities proposed will include an evaluation of the analytical results obtained from all samples collected during the sampling programs, so that data quality can be assessed relative to individual analyses and overall sampling program performance.

2.0 FIELD EQUIPMENT

A variety of instruments may be used to collect data during the course of site investigations and monitoring programs at the site. All instruments and equipment used will be maintained, calibrated, and operated according to the manufacturers' guidelines and recommendations. When in the field, a photocopy of the manufacturer's operation and calibration recommendations will accompany each instrument, and a copy of the calibration, maintenance, and repair log will also be kept on-site for each instrument.

2.1 FIELD EQUIPMENT CALIBRATION

The following equipment and calibration procedures shall be used where appropriate for the field investigation.

Steel measuring tapes - For surface measurements and measuring of well depths. Calibration: Tapes will be inspected at least one time per week to check for kinks, stretching, or worn markings.

Electric water level meters - For water level measurements in wells. Calibration: Meter tapes will be checked against steel surveyor's tape at the beginning and end of each monitoring round.

Digital pH meter - pH meters will be calibrated to a pH 7 buffer and another buffer solution with a pH spanning the range of pH values to that of the sample (typically either a pH of 4 or 10) prior to the measurement of each individual sample. Due to the significant effect that temperature has on pH measurements, the temperature of the buffer solution will also be measured and adjusted on the pH meter prior to calibration. After calibration, the pH probe will be rinsed with distilled or deionized water, and the temperature of the sample will be measured. If the sample temperature varies from the buffer temperature, then the pH meter will be adjusted to the sample temperature. The temperature compensation procedure is not needed for pH meters with automatic temperature compensation. The pH meter will be kept in the shade at all times, if possible.

Electrical conductivity meter - For measurement during well development and purging. Calibration: Factory calibrated annually. Temperature correction applied during measurement. Daily check using standard solution (0.00702N potassium chloride) at ambient temperature.

Mercury thermometers - Mercury thermometers may be used for measurement of water temperatures during well development and purging. Calibration: Factory calibrated.

Multiple Sensor Meter (pH, Dissolved Oxygen, Conductivity, Temperature, Turbidity – For measurement during well development and purging. Calibration: At least daily, submerge the probe into the calibration beaker filled with manufacturer auto-calibration solution and press the button to obtain a simultaneous one-point calibration.

Equipment not listed herein will be calibrated according to manufacturers' recommendations and/or generally accepted practice. Calibration procedures will be documented for the project file. Instruments for which calibration cannot be easily checked will be either tested against another instrument of a similar type, or will be returned to the manufacturer for appropriate calibration. If tested against another instrument capable of making the same measurements, variation between instruments must not exceed five percent. If readings vary more than five percent, the instrument will be returned to the manufacturer for calibration.

Scheduled periodic calibration of testing equipment will not relieve field personnel of the responsibility of employing properly functioning equipment. If equipment malfunction is suspected, the device will be removed from service, tagged so that it is not inadvertently used, and the appropriate personnel notified so that re-calibration can be performed or a substitute piece of equipment can be obtained.

2.2 MAINTENANCE OF FIELD EQUIPMENT

All field equipment will be maintained by the company from which it is subcontracted/owned, or by the technicians in the laboratory. Any equipment or device determined to not be in good working order will be replaced or repaired promptly. A record of instrument calibration and maintenance will be maintained. For instruments that require frequent calibration, and to enable the user to document the procedures used to verify the accuracy of the instrument, a service manual will accompany the instrument at all times.

Equipment that fails a calibration check, or becomes inoperable during use, will be removed from service. It will be segregated to prevent inadvertent use and tagged to indicate it is out of calibration. Such equipment will be repaired and satisfactorily re-calibrated prior to future use. Equipment that cannot be repaired will be replaced.

Results of activities performed using equipment that has failed re-calibration will be evaluated. If the activity results are adversely affected, the results of the evaluation will be documented and the appropriate personnel notified.

3.0 FIELD MEASUREMENTS

Water level measurements - Water levels will be measured to 0.01 foot under static water level conditions with an electric water level meter. Water level will be measured at least twice and the arithmetic mean reported.

pH - After calibration of the pH meter, the pH probe will be rinsed with distilled or deionized water in a wash bottle and allowed to air dry. During measurement, several readings will be taken and the arithmetic mean used as the reported value. The probe will be sprayed with distilled or deionized water or clean water after the sample measurement for storage. The user's manual for the pH meter will be available to field personnel.

Electrical conductivity - Calibration of the conductivity meter will be performed a minimum of once per day. A standard solution of known conductivity will be available to check precision. After calibration, the probe will be rinsed with distilled or deionized water in a wash bottle and allowed to air dry. During measurement, several readings will be taken and the arithmetic mean used as the reported value. The user's manual for the electrical conductivity meter will be available to field personnel.

Multiple Sensor Meter (pH, Dissolved Oxygen, Conductivity, Temperature, Turbidity – Calibration of the multiple sensor meter will be performed a minimum of once per day. After calibration, the probe will be rinsed with clean water. During well pumping the discharge water is routing through a flow-through cell attached to the probe for measurement. Measurements will be taken at regular intervals (depending on the water discharge rate) to evaluate water quality and assess parameter stabilization. The user's manual for the multiple sensor meter will be available to field personnel.

Flow rates - Because flow rates may change, several single instantaneous readings on a flowmeter or calibrated receptacle will be made throughout the duration of pumping.

Surveying Data - All sampling sites will be located on aerial photographs or other maps by reference to known features. Generally, location accuracy will be better than 5 feet. The elevation of sampling sites and monitoring wells that have not been previously surveyed will be surveyed to the nearest 0.01 foot. This survey will be tied into a benchmark from the coordinate system.

4.0 FIELD QA/QC FOR WATER SAMPLING AND ANALYSIS

Sample labels/tags - All sample tag/labels shall include the analyses to be performed, the sample identifier, date of collection, time of collection, sampler's signature or initials, type of sample (grab or composite), and whether any preservatives were added. All information included on the sample tag/label shall be cross-referenced in the field logbook, including the sample tag/label number. The field sampler in charge shall complete a sample tag/label for each container. All sample tag/label information shall be inscribed using waterproof ink.

Field QC samples shall also be assigned a similar sample number to prevent the laboratory from identifying those samples. In addition, to prevent the field blank samples from being used for laboratory QC analyses (i.e., matrix spikes), a unique sample shall be designated for laboratory use, and a notation that the sample is to be used for laboratory QA shall be made on the sample tag and the chain-of-custody record.

To be confident that the sample handling and decontamination procedures do not induce contaminant introduction into the samples, and to verify the laboratory's ability to reproduce results for nearly identical samples, trip blanks, equipment blanks, and field duplicates will be prepared and submitted to the laboratory along with the actual field samples.

The water to be used for field blanks should meet the standard of the American Society for Testing and Materials for Type II water, and shall be obtained from the laboratory performing the analyses. All blanks submitted for analysis shall be labeled in the same manner as in the regular samples, to prevent the laboratory from identifying them and handling them differently. These QA/QC samples are described below.

Trip blanks - Trip blanks will be used when water samples are collected in the field. Trip blanks provide a check on contaminants that may have originated from sample handling and transportation activities, and/or in the laboratory. A trip blank is required with each shipment of samples for volatile analysis only when no other blank is analyzed. A trip blank for volatile organic analysis will be prepared in the laboratory by filling sample containers with analyte-free water and shipping the blank to the site along with the empty sample containers. The trip blank will be numbered, packaged, and sealed in an identical manner as the other water samples collected for volatile organic analysis and will be carried to the well and set next to the well during sampling along with the empty sample containers. The trip blank will then be shipped with the other samples to the laboratory for analysis. At no time will the trip blank be opened during sampling. Trip blanks will be included with groundwater samples at a rate of one per day.

Equipment blanks - An equipment blank is analyte-free water, supplied by the laboratory, that is poured into or pumped through decontaminated sampling equipment and collected in sampling containers. The equipment blank will identify sample contamination that is associated with improper sample equipment decontamination, bottle contamination, or contamination associated with bottle or sample shipment. The equipment blank will not, on its own, identify the exact source of contamination. Equipment blanks will be prepared in the field during the day, or at the end of each sampling day, by pouring analyte-free water through recently decontaminated groundwater sampling equipment. The analyte-free water will then be placed in 40-ml glass vials, sealed, labeled, and stored along with all other samples in an ice-cooled container. The equipment blanks will be analyzed for the same VOCs as the other groundwater samples. At least one equipment blank/day/sample crew will be required for each laboratory being used.

Field duplicates for water samples - A field duplicate is a second sample collected from a given location and must be taken concurrently with the primary sample. A field duplicate sample provides the data user with information regarding the precision of the analysis being completed. A lack of precision may indicate that the sample matrix is not homogeneous or that the sampling and analytical procedures are not capable of providing consistent results. If the results of duplicate analyses do not fall within the control limits specified for the analysis, actions should be taken to correct the situation and the data should only be used with a recognition of its potential lack of precision. Field duplicates will be collected from the same sampling apparatus as the primary samples, and will be packaged, sealed, and analyzed in an identical manner as the primary water sample. To prevent special handling of the samples by the laboratory, samples collected for duplicate analysis will not be identified as duplicates to the laboratory. Field duplicates will be collected at the rate of five to ten percent of the total number of water samples collected.

Split samples - Split samples are typically collected to evaluate the comparability of results from two or more laboratories performing the same analysis or to verify the capability of one laboratory to perform an analysis. The same sampling equipment shall be used for collecting both sets of samples and sample bottles for all laboratories will be obtained from the same source.

When it is necessary to use more than one laboratory because a single laboratory cannot provide the capability necessary, a minimum of ten percent of the samples will be split and analyzed by each. Data are not necessarily comparable and should be used with caution when the results of two or more split samples do not agree within ten percent, or other mitigating circumstances are identified. If the split-sample results show a great deal of variance or one laboratory consistently shows analytes above detection limits while the other does not, a problem likely exists that must be corrected immediately. After identification and resolution of split-sample discrepancies, the affected samples must be re-analyzed, if sample holding times permit, or new samples should be obtained.

5.0 LABORATORY QA/QC FOR ALL SAMPLES

This section specifies the minimum laboratory QA/QC requirements, including a laboratory certification/performance evaluation program, QA/QC documentation, and data validation.

Groundwater samples shall be analyzed using drinking water protocols, so that detection limits are below State and Federal maximum contaminant levels (MCLs).

Laboratories must have in place a documented analytical QA/QC program that will include procedures followed on a daily basis to reduce variability and errors, identify and correct measurement problems, and provide a statistical measure of data quality. The basic requirements for a laboratory QA/QC program are described in the US EPA's Test Methods for Evaluating Solid Waste. Data whose quality does not meet the requirements of this document, regardless of laboratory certification, shall be excluded. All relevant detailed portions of the laboratory QA/QC program will be considered an official part of the project record.

Water analyses shall be performed using appropriate methods approved by US EPA. The Director of the laboratory whose name appears on the certification shall agree to the following responsibilities: 1) supervise all analytical work in his/her laboratory; and 2) sign all reports. All monitoring instruments and equipment shall be properly calibrated and maintained for accuracy of measurements.

Method selection - The methods of analysis and the detection limits used shall be appropriate for the State Primary Drinking Water Standard, Federal MCL, or other established ARAR, and for the expected concentrations. For monitoring of any constituent or parameter that is found in concentrations that produce more than 90 percent non-numerical determinations (i.e., "trace" or "ND") in data from Background Monitoring Points for that medium, the analytical method having the lowest method detection limit (MDL) shall be selected. For organic chemical constituents identified in 40 CFR Part 258 Appendix I, the laboratory will use EPA Method

8260. For the remaining organic chemical constituents listed in Appendix II, EPA Methods 8270, 8150, and 8080 shall be used, or the most current EPA-approved methods for semivolatile organics, herbicides, and pesticides and PCBs, respectively.

Nominal MDL and Practical Quantitation Limit (PQL) - MDLs and PQLs shall be derived by the laboratory for each analytical procedure, according to laboratory accreditation procedures established by the State of California. These nominal MDLs and PQLs shall reflect the detection and quantifying capabilities of the specific analytical procedure and equipment used by the laboratory, rather than simply being quoted from US EPA analytical method manuals. If the laboratory suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived nominal MDL/PQL values, the results shall be flagged accordingly, along with an estimate of the detection limit and quantitation limit actually achieved.

Trace results - Analytical results falling between the MDL and the PQL shall be reported as "trace" (along with the laboratories best estimate of the actual concentration), and shall be accompanied both by the (nominal or estimated) MDL and PQL values for that analytical run.

QA/QC data - All QA/QC data shall be reported along with the sample results to which it applies, including: the method, equipment used and analytical detection limits, the recovery rates and an explanation for any recovery rate that is less than 80 percent, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recovery. In cases where contaminants are detected in QA/QC samples (i.e., field, trip, or laboratory blanks), the accompanying sample results shall be appropriately flagged.

Common laboratory contaminants - A procedure must be identified to evaluate the significance of analytical results for a constituent that is a common laboratory contaminant (e.g., methylene chloride, acetone, diethylhexyl phthalate, and di-n-octyl phthalate). If the QA/QC samples show evidence of laboratory contamination for a constituent, then analytical results involving detection of this constituent in any background or downgradient sample shall be reported and flagged.

Unknowns - Unknown chromatographic peaks shall be reported, along with an estimate of the concentration of the unknown analyte. When unknown peaks are encountered, second column or second method conformation procedures shall be performed to attempt to identify and more accurately quantify the unknown analyte.

6.0 GROUNDWATER SAMPLING PROCEDURES

The following sampling and decontamination procedures provide minimum requirements that shall be followed when performing groundwater sampling at the Gregory Canyon Landfill. Depending on the location of the well, two separate sampling procedures are proposed for the Gregory Canyon Landfill. As a result of the hydraulic barrier proposed at the point of compliance (POC), all compliance bedrock aquifer wells will be sampled in accordance with the

procedures discussed under the bedrock compliance well sampling procedures section. All other wells (alluvial and bedrock-background/cross-gradient) will be sampled in accordance with the procedures discussed under standard sampling procedures section.

Decontamination - Before initial sampling, all sampling equipment shall be washed with a non-phosphate detergent and rinsed with tap water and distilled or deionized water. All rinsing shall be performed by pouring the medium directly over the sampling equipment. Sampling equipment shall be dedicated to a well, or adequately decontaminated between use, or be made of disposable material. If sampling equipment cannot be dedicated to a well, a sample of the final rinsate shall be analyzed as a rinsate blank at a frequency of one per day for all sample parameters. If sampling equipment cannot be dedicated to a well and is to be decontaminated between uses, the wells must be sampled in order of anticipated increasing contamination.

Procedures to be used for groundwater sampling are outlined in the Practical Guide for Groundwater Sampling and RCRA Groundwater Monitoring Technical Enforcement Guidance Document.

Standard Purging Procedures for Sampling – Prior to collecting groundwater samples, purging of a well is necessary to provide a representative sample of groundwater that approximates formational conditions. Temperature, pH, turbidity, and EC or conductivity of the purged water are measured to evaluate whether stable conditions have been achieved. It is assumed that stability or formational conditions have been achieved when the difference between successive field indicator measurements is less than ten percent. The amount of water that must be purged from a well is a function of the stability of the measured parameters, as well as the recovery rate of the well. Purging should be performed at a sufficiently slow rate so that recharging water does not cascade in the filter pack and casing.

A well is considered to be fast recharging if groundwater levels recover to within 80 percent or more of the original static water level within two hours of purging. A minimum of one borehole volume should be purged before temperature, pH, turbidity, and EC parameters are measured in the purged water. An additional one-half borehole volume should be purged prior to re-measuring the water quality parameters. It is assumed that stability or formational conditions have been achieved when the difference between successive measurements is less than ten percent. If the values vary by more than 10 percent, additional one-half borehole volumes should be purged until temperature, pH, and EC parameters have adequately stabilize, up to a total of three borehole volumes. The well should be allowed to recharge to 80 percent of its static condition prior to sample collection.

A well is considered to be slow recharging if groundwater levels do not recover to within 80 percent or more within two hours of purging. Slow recharging wells should be purged by removing one borehole volume of water, and then allowing the well to recover for up to two hours prior to collecting samples.

A borehole volume is the amount of water contained within the casing of a well (called a casing volume) plus the water contained within the filter pack surrounding the well casing. The following equation is used to calculate the borehole volume in the screened interval of a well:

$$\text{Borehole volume (gallons)} = (7.48\pi/4)[CD^2+P(BD^2-CD^2)](WD-GW)$$

Where:

BD = borehole diameter (feet)
CD = casing diameter (feet)
P = porosity of filter pack (as a decimal)
WD = well depth (feet)
GW = depth to groundwater (feet)

The following equation is used to calculate the borehole volume in the unscreened interval of a well:

$$\text{Borehole volume (gallons)} = (7.48\pi/4)(CD^2)(WD-GW)$$

Where:

CD = casing diameter (feet)
WD = well depth (feet)
GW = depth to groundwater (feet)

Bedrock Compliance Well Purging Procedures for Sampling – As a result of very low flow rates in the majority of bedrock wells at the POC, a permanent dewatering condition at the POC is proposed for the Gregory Canyon Landfill, thereby creating a hydraulic sump. To achieve a permanent dewatering condition at the POC, bedrock wells will be equipped with float sensors and electric submersible pumps. As a result, additional purging of bedrock wells at the POC is unnecessary to provide a representative sample of groundwater that approximates formational conditions. Prior to sample collection each bedrock well would be allowed to recover (no greater than 48 hours), until a sufficient volume of water enters the well to collect a sample.

Sample retention - Sample containers should be filled based on decreasing volatility. That is, containers used to analyze for VOCs should be filled first, followed by semi-volatiles, pesticides and PCBs, metals, and general chemistry constituents. Samples shall be collected using either an approved, non-aerating dedicated submersible pump; bladder pump; or bottom-loading stainless steel or Teflon bailer with a bottom emptying device and a flow control device for the bottom of the bailer. VOC vials shall be filled by pouring the sample down the sides of the container with as little turbulence as possible. Vials shall be filled completely and immediately capped leaving zero airspace in the vial. The vial shall then be turned upside down, and tapped to check for air bubbles. If an air bubble is trapped in the vial, and exceeds the size of a pea, the sample shall be discarded and a new sample collected; the remaining sample is not to be topped off. For VOC analysis, a minimum of two vials shall be collected per sample; however, they shall not be composited or mixed. VOC samples should never be field-filtered.

With the exception of metals samples, which may require field-filtering, all groundwater samples shall be poured directly into the sample containers. Samples should never be transferred from one sample container to another. Groundwater samples shall be preserved immediately after collection and then cooled with ice to about 4°C until analysis.

7.0 SURFACE WATER SAMPLING PROCEDURES

The following sampling and decontamination procedures provide minimum requirements that shall be followed when performing surface water sampling at the Gregory Canyon Landfill.

Surface water locations will be sampled by submersing the laboratory-supplied sampling container, or a decontaminated dipper, in a slow moving portion of the surface water at each designated sampling station, taking precautions to not unduly agitate the water. Stagnant water will not be sampled if this can be avoided. If several samples are to be taken, the sampler will start at the downstream position and move upstream.

Equipment decontamination, sample handling, and sample documentation procedures will be similar to those used for groundwater sampling, but samples should be field-filtered immediately upon collection.

Analytical procedures will be similar to those used for analysis of groundwater samples.

8.0 LEACHATE, SUBDRAIN AND DRAINAGE LAYER SAMPLING PROCEDURES

The following sampling and decontamination procedures provide minimum requirements that shall be followed when performing sampling of the leachate, leak detection/drainage layer (between the upper and lower high density polyethylene [HDPE] liner systems) and subdrain at the Gregory Canyon Landfill.

Leachate, drainage layer and subdrain samples will be collected from their respective sump(s) or tank. Samples will be collected with a disposable Teflon bailer with a bottom-emptying device and a flow control device for the bottom of the bailer. VOC vials shall be filled by pouring the sample down the sides of the container with as little turbulence as possible. Vials shall be filled completely and immediately capped leaving no airspace in the vial. The vial shall then be capped, turned upside down, and tapped to check for air bubbles. If an air bubble is trapped in the vial, and exceeds the size of a pea, the sample shall be discarded and a new sample collected; the remaining sample is not to be topped off. For VOC analysis, a minimum of two vials shall be collected per sample; however, they shall not be composited or mixed. VOC samples should never be field-filtered.

Equipment decontamination, sample handling, and sample documentation procedures will be similar to those used for groundwater sampling, but samples to be analyzed for metals should be field-filtered immediately upon collection, or stored in a container without preservative for laboratory filtering upon arrival at the laboratory.

Analytical procedures will be similar to those used for analysis of groundwater samples.

9.0 SAMPLE CUSTODY AND DOCUMENTATION

Sample custody and documentation procedures described in this section will be followed to account for all project documents including: logbooks, field data records, correspondence, sample tags/labels, graphs, chain-of-custody records and any other project-specific information.

Sample identification documents - The following documents will be used to maintain identification and chain-of-custody of all samples and to control sample disposition.

Sample tags and labels - All samples shipped to the laboratory shall have either a sample tag or label attached to each container. At a minimum, the sample tag/label shall include space to identify analyses to be performed, the sample identifier, date of collection, time of collection, sampler's signature or initials, type of sample (grab or composite), and whether any preservatives were added. All information included on the sample tag/label shall be cross-referenced in the field logbook, including the sample tag/label number. The field sampler in charge shall complete a sample tag/label for each container. All sample tag/label information shall be inscribed using waterproof ink.

Field logs - When field measurements are taken, results shall be recorded directly on field data sheets. The entries shall include the sample identifier, date and time (military) of the measurement, sampler's name, and any observations made at the time of the measurement. Types of field measurements shall include, but not be limited to pH, conductivity, water temperature, and water level. Visual observations include physical appearance of the water samples (color, turbidity, and suspended solids), and physical appearance of the well.

Field data sheets shall be used to record all pertinent information throughout the project using waterproof ink. The individuals making entries shall sign the logbooks after each entry. All entries shall be dated. Entries shall be objective and factual since they may later be used for report preparation and are considered legal documents. Typically, the following information should be recorded in the field before, during, and after sampling:

GENERAL
- Well I.D.
- Date and time

ELEVATION
- Elevation of measuring point (±0.01 feet)
- Depth to water table (±0.01 feet)
- Depth to bottom of well casing (±0.01 feet)
- Depth to top of screened interval (±0.01 feet)

PURGING
- Casing diameter
- Borehole diameter
- Water column in perforated zone
- Water column in blank casing zone
- Pre-sampling purged volume (up to 3 borehole volumes)

Purging device (e.g., submersible pump, bailer)
Purging rate
Time at beginning and end of purging
Well recovery rate (measured after sampling)
Disposition of purged water (e.g., barrels, baker tank)

FIELD MEASUREMENTS

Temperature
pH
Conductivity
Turbidity (NTU)

SAMPLING

Sampling device
Placement of sampling device (bottom, top, or middle of water column)
Sampling flow rate

Chain-of-Custody records - All samples shall be collected under chain-of-custody procedures to maintain and document sample possession. All samples will be accompanied at all times by this Chain-of-Custody record. When transferring samples, the individuals relinquishing and receiving samples will sign, date, and note the time on the record. This record will be used to document sample custody transfer from the sampler, to another team member, to a shipper, or the laboratory.

Samples will be packaged properly for shipment and dispatched to the laboratory for analysis, with an appropriate Chain-of-Custody record identifying its contents accompanying each shipment. The method of shipment, courier name(s), and other pertinent information will be entered in the "Remarks" section of the Chain-of-Custody record.

The original record accompanies the shipment. If sent by mail, the package will be registered with return receipt requested. If sent by common carrier, a bill of lading will be used. Freight bills, Postal Service receipts, and bills of lading will be retained as part of the permanent documentation. Whenever samples are split with another party, it will be noted in the "Remarks" section of the Chain-of-Custody record. The note will indicate with whom the samples were split and will be signed by both the sampler and recipient. All shipments will be accompanied by the Chain-of-Custody record identifying its contents.

The field sampler is responsible for the care and custody of the samples until they are shipped or otherwise delivered to the laboratory custodian. Custody seals shall be used whenever samples are not in someone's possession. Custody seals may be placed directly on the sample container, a shipping cooler, or the door to a storage facility. Custody seals shall be placed so that it is not possible to tamper with the samples without breaking the seal. Custody seals may be placed on individual sample bottles; however, care must be taken not to cover the Teflon septum on volatile organic analysis vials. Placing custody seals on individual bottles will maintain sample integrity if the seals on the shipping container are accidentally broken.

When transferring the possession of samples, the persons relinquishing and receiving the samples shall sign, date, and note the time on the Chain-of-Custody record. This record documents sample custody from the person responsible for sample packaging, to the sampler, and finally through the laboratory. Any person who assumes custody of the samples, including mail clerks, must sign the Chain-of-Custody record. Overnight carriers typically refuse to sign Chain-of-Custody records; thus, when samples are relinquished to an overnight carrier, the signed chain-of-custody record must be placed into the shipping container along with the samples and the shipping containers must be sealed by the person relinquishing custody. The carrier may then transport the samples to the destination. Upon receipt, the person who opens the shipping container shall sign the Chain-of-Custody record, accepting custody of the samples. This is sufficient to maintain custody as long as the seals are not broken during shipment. If a custody seal is broken during shipment, the contractor in charge of sampling shall immediately be notified.

All sample shipment containers shall be accompanied by a Chain-of-Custody record that corresponds to the samples contained within. The original record shall accompany the shipment, and a copy shall be retained by the sampling coordinator.

Shipping of samples - Samples will be delivered to the laboratory for analysis as soon as practical after the number of samples and number of coolers are sufficient to comprise a shipment (preferably the same day the sample was taken, but never exceeding the prescribed sample holding time for the specified analyses). The shipment will be accompanied by the Chain-of-Custody record.

Laboratory custody - A designated sample custodian shall accept custody of the shipped samples and verify that the information on the sample tags/labels and matches the information on the Chain-of-Custody records. Important information regarding the shipment shall be documented, including whether the custody seals are intact, sample bottles are broken, or samples were not stored properly (e.g., the analytical laboratory shall report the temperature of the shipped contents when received).

The sample custodian shall use the sample identifier (i.e., tag number) or assign a unique laboratory number to each tag to track the sample through the laboratory. The sample custodian shall then maintain custody in a secure temperature-controlled area until sample analysis. The custodian shall distribute samples to the appropriate analysts who are responsible for the care and custody of the samples until they are exhausted or returned to the sample custodian.

When all sample analyses and QA/QC checks have been completed, the unused portion of each sample shall be properly stored. All identifying tags/labels, data sheets, and laboratory records shall be retained as part of the permanent documentation. Prior to destruction of any records, either originals or copies of the records shall be offered to the Client and/or its Contractor.

Corrections to documentation - As previously stated, all original data shall be written in waterproof ink. If waterproof ink cannot be used, a logbook notation shall be made to explain why it was not used. Corrections shall be made by drawing a single line through the incorrect

entry and then adding the correct entry. The person recording the initial entry shall, if possible, make all corrections. All corrections shall be initialed and dated by the person recording them.

10.0 SAMPLE HANDLING AND PACKING

Sample handling - The procedures for collecting water and other liquid samples (leachate, drainage layer liquid) requires that the sample be discharged directly to the sample container(s). This section describes sample container requirements and shipping requirements. Required sample containers for specific analyses are listed in the approved analytical method.

Sample containers - Sample containers will be obtained from the laboratory performing the analyses. The laboratory must have documented standardized bottle washing procedures and be capable of demonstrating the cleanliness of the containers through its QA program. Sample containers may also be purchased through an outside source if that source has a QA program in-place to demonstrate that the containers are clean. Sample containers must be cleaned specifically for the analysis to be performed.

Sample custody starts with the cleaning of the sample containers. Once they are cleaned and packaged, custody seals shall be placed on the packages to document that they have not been tampered with during shipment. The seals shall only be broken when it is time to use the containers. Any unused containers shall remain in custody or in a secured area until they are used. When opening a new package of containers, the condition of the custody seal shall be recorded in the field logbook.

Sample shipping - The short holding times associated with many sample analyses may make it necessary to ship samples by either overnight or common carrier. Samples preserved with nitric acid may not be shipped on passenger aircraft or railroads. All State, Federal and Local regulations must be carefully observed when shipping any type of sample.

The following guidelines allow for the proper shipping of most samples using an overnight air service. A detailed description of proper shipping techniques is presented in the User's Guide to the Contract Laboratory Program and NEIC Policy and Procedures.

Samples shall be placed in a leak-proof shipping container and cooled using ice packs or ice sealed plastic bags to cool the samples at about 4°C. A picnic-type cooler works well; however, other shipping containers may be used. To prevent breakage, bubble-wrap or an alternative material shall be placed around the samples so they do not touch each other or the sides of the shipping container. The Chain-of-Custody Records and other paperwork that must accompany the shipment shall be sealed in a plastic bag and taped to the inside of the lid of the shipping container. The cooler is then closed and wrapped with strapping tape and any drain plugs should be taped shut. Custody seals are placed on the cooler in opposite corners so they will be broken if the container is opened during shipment. Finally, the container is ready for shipping when all necessary shipping labels and address labels are applied.

11.0 REFERENCES

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